

L9 Predicting the Number of Roots of Quadratics

Recall: For a quadratic relation
roots = zeroes = x-intercept = solutions

Given vertex form, look at:

- the location of the vertex (above/below x-axis?)
- the direction of opening (up/down?)

Ex.1 $y = 3(x - 5)^2 - 1$

V(,)

The vertex lies **above/below?** the x - axis.

The parabola opens **up/down?**

zero(es): _____

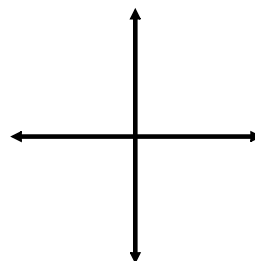
Apr 15-1:05 PM

Ex.2 $y = -2(x + 1)^2$

V(,)

The vertex lies on the x-axis

zero(es): _____



Apr 19-8:11 PM

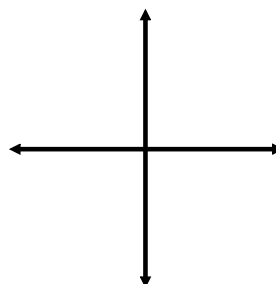
Ex.3 $y = 3(x - 5)^2 + 6$

V(,).

above/below? the x-axis

opens up/down?

zero(es): _____



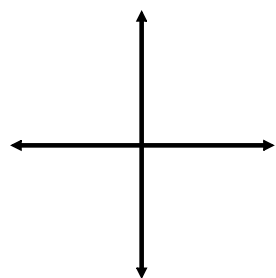
Ex.4 $y = -0.5(x + 3)^2 + 11$

V(,).

above/below? the x-axis

opens up/down?

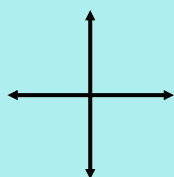
zero(es): _____



Apr 15-1:14 PM

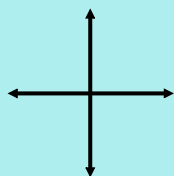
In general to identify the zeros from vertex form:

There will be 0 zeroes if the vertex is _____ the x-axis
and the parabola opens _____

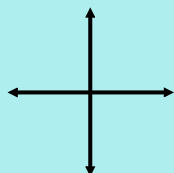


OR if the vertex is _____ the x-axis
and the parabola opens _____

There will be 1 zero if the vertex is _____ the x-axis



There will be 2 zeroes if the vertex is _____ the x-axis
and the parabola opens _____



OR if the vertex is _____ the x-axis
and the parabola opens _____

Apr 15-1:16 PM

What if the quadratic is in standard form?

1. Factor and find the number of roots directly.
2. Complete the square (vertex form) and deduce the number of roots by visualizing the graph.
3. Use the quadratic formula if:
 - it cannot be factored
 - the numbers are too difficult to work with

Ex.1 Use the quadratic formula to determine the zeroes.

(a) $-2x^2 - 4x - 2 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

root(s): _____

root(s):

(b) $y = 3x^2 - 30x + 74$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

root(s): _____

root(s):

Apr 15-1:28 PM

(c) $y = 3x^2 - 30x + 81$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

root(s): _____

root(s):

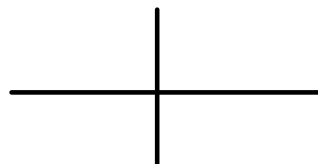
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$D = b^2 - 4ac$ is called the discriminant.

It tells you how many zeros the quadratic has.

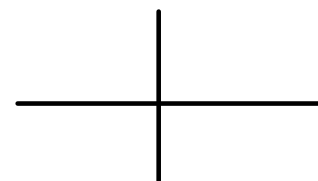
D is positive
 $b^2 - 4ac > 0$

two real roots



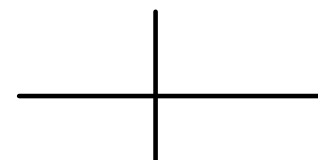
D is zero
 $b^2 - 4ac = 0$

one real root
(double root)



D is negative
 $b^2 - 4ac < 0$

no real roots



Nov 24-1:34 PM

Ex.2 Find how many zeros each of the following quadratic relations has using the discriminant.

(a) $y = x^2 - 6x + 7$

(b) $y = 2x^2 - 5x + 9$

(c) $y = x^2 + 3x - 11$

(d) $y = 9x^2 - 24x + 16$

Nov 24-1:38 PM

Assigned Work:

p.350 # 2, 3, 4, 5, 7, 9, 10, 12

Apr 19-8:15 PM